

## SMALL ARTIFICIAL ANT-NESTS OF NOVEL PATTERNS.

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The study of the behavior of ants, which is attracting an ever increasing number of investigators, has led to the invention of several different patterns of artificial nests. Those used by the older writers, such as Swammerdam<sup>1</sup>, Pierre Huber<sup>2</sup> and Lubbock<sup>3</sup> contained earth, and some of the more modern nests recommended by Wasmann<sup>4</sup> and others also contain this substance. A new departure was initiated by Janet<sup>5</sup> in his plaster of Paris nests and by Miss Adele M. Fielde in the glass nests which she has devised<sup>6</sup>, since both of these investigators dispense with earth as an untidy, and superfluous accessory. Veihmeyer<sup>7</sup> has suggested some improvements in the construction of the Janet nest, and Miss Buckingham<sup>8</sup> and I<sup>9</sup> have endeavored to introduce certain modifications in the structure of the Fielde nest; Miss Buckingham substituting aluminum for the glass base, thus greatly diminishing its weight, while I have substituted plaster of Paris, thus combining the principles of the Janet and Fielde nests and facilitating construction. Emery<sup>10</sup> has very recently published an account of a modification of the Janet nest, which, owing to its cheapness and durability, and the ease of its construction, merits the attention of all those who are studying living ants in the laboratory. I subjoin a translation of his directions for making this piece of apparatus.

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<sup>1</sup> Biblia Naturæ, Leyden 1737.

<sup>2</sup> Recherches sur les mœurs des Fourmis indigènes. Paris et Genève, 1810.

<sup>3</sup> Ants, Bees and Wasps. Rev. Ed. Internat. Sci. Ser. N. Y. Appleton & Co., 1894.

<sup>4</sup> Die psychischen Fähigkeiten der Ameisen. Zoologica XI, 26, 1899, 132 pp. 3 pls. Rev. Ed. 1909, 188 pp. 5 pls.

<sup>5</sup> Appareil pour l'Élevage et l'Observation des Fourmis. Bull. Soc. Zool. France, XVIII, 1893, pp. 168-171; Appareils pour l'Observation des Fourmis et des Animaux myrmécophiles. Mém. Soc. Zool. France X, 1897, 22 pp., 3 figs., 1 pl.

<sup>6</sup> Portable Ant-Nests. Biol. Bull. II, 1894, pp. 81-85, 3 figs; Portable Ant Nests, *ibid.*, VII, 1904, pp. 215-220, 1 pl. 2 figs.

<sup>7</sup> Beobachtungsnester für Ameisen, "Aus der Heimat," 1905, Heft 1, 11 pp., 6 figs.

<sup>8</sup> A Light-weight, Portable Outfit for the Study and Transportation of Ants. Amer. Natur., Oct. 1909, pp. 611-614.

<sup>9</sup> On the Founding of Colonies by Queen Ants, with Special Reference to the Parasitic and Slave-making Species. Bull. Amer. Mus. Nat. Hist., XXII, 1906, pp. 33-105, 7 pls., 1 fig.

<sup>10</sup> Kleine Künstliche Ameisennester, Zeitschr. f. wiss. Insektenbiol. V, 1909, p. 403.

"This summer I have used a style of artificial nest which is excellently adapted for experiments on a small or very small scale, e. g. for making observations on single fertilized queens while they are founding their colonies. These nests have, moreover, the advantage of being extremely cheap and easy of construction.

"I make these nests from hollow tiles, such as are used in building light walls. These tiles, which are perforated with holes, are sawed, at right angles to the holes, into plates of the required thickness. Since the saw is soon blunted by this operation, I use an old one that is more or less worn.

"Then I have each plate ground down till it is smooth on both sides. On one of these sides, which is to become the floor of the nest, I fill in the openings with plaster of Paris, and the other side is covered with a glass plate of suitable dimensions. The cavities can then either be left as so many separate chambers or connected with one another by means of grooves, or even have one of their walls perforated with a glass tube to serve as a communication with some other piece of apparatus. One of the chambers can be used as a water reservoir (as in the Janet nests) and remain isolated while the others are made to communicate with one another by means of grooves.

"A convenient method of supplying these nests with the requisite amount of moisture is to place them on a layer of damp moss.

"Plates of hollow tiling may also be conveniently employed as porous and quickly drying bases for ordinary Janet nests, as their lower surfaces are thereby prevented from becoming mouldy."

A small artificial nest of still a different pattern is employed by Dr. F. Santschi of Kairouan, Tunis, in his studies on colonies of diminutive ants which have to be kept in very tight receptacles. He described its construction to me in the course of a conversation, which I had with him in Lausanne during the past summer, as follows:

The base of the nest consists of a rectangular glass plate, such as is most conveniently obtained by cleaning an unsuccessfully exposed photographic plate of ordinary dimensions, say  $3 \times 4$  or  $4 \times 5$  inches. Wet plaster of Paris is poured onto this plate in the form of the heavy lines in the accompanying diagrams, which represent nests with two and three chambers respectively, connected by galleries. Of course, any other design which suggests itself as suitable, may be used instead, if desired. Before the plaster has set, a second glass plate of the same size and shape as the base and previously covered with a film

of sweet oil is pressed down onto the plaster till it forms walls only a few millimeters in height. After the plaster has set, the roof-pane is removed, cleaned and cut into two or more pieces with a diamond along lines (dotted in the figures) which bisect the short galleries, and then replaced as covers of the chambers. The ants can be introduced into the nest by sliding the covers apart a short distance over one of the galleries. The plaster is sufficiently porous to provide for ventilation and a thin slice of wet sponge or a tuft of wet moss or cotton, placed in one of the chambers, will furnish the requisite amount of moisture. Nests of this description are very useful as they can be placed on the

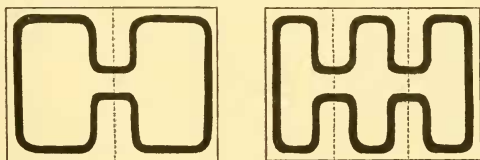


Fig. 1. Diagrams of nests devised by Santschi.

stage of the compound microscope, or preferably of the Zeiss binocular and their inhabitants studied under a low objective. Santschi recommends his nests for the study of such small ants as the various species of *Leptothorax*, *Myrmica*, *Tapinoma*, *Bothriomyrmex*, *Myrmecina*, *Stenamma*, *Goniomma*, *Oxyopomyrmex*, etc., and their parasites and myrmecophiles, but they would be equally useful for very small colonies of larger ants and for studies on the foundation of colonies by single queens, not to mention all observations in which a few workers are to be kept in isolation for some purpose. These nests can be so easily and rapidly made that they will prove to be very useful for travelers.